

Appropriate Spatial Resolution for Vegetation Cover Mapping Based on LCTA at Fort Hood, Texas

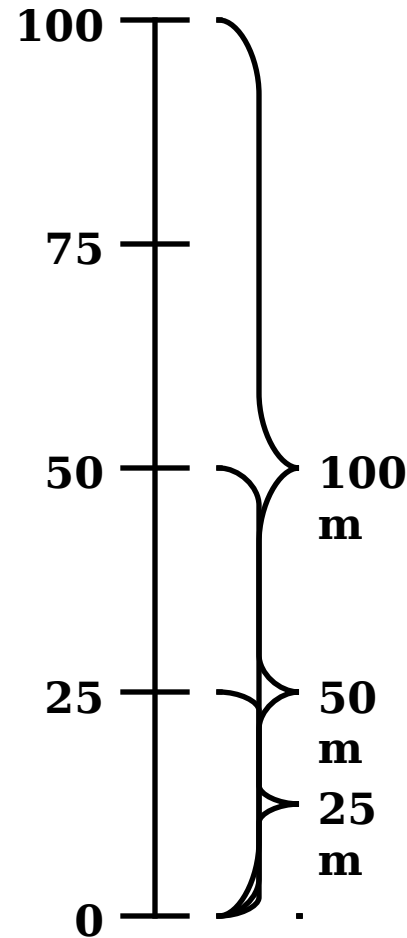
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Identify Optimal Sampling Design Based on Cost

- Cost (person-minutes) considers: travel; setup; and sampling time
- Sample design – plot and sample size
- “Optimal” definition is based on error budget and geo-statistical theory: minimize local (at plot) and regional (all Ft. Hood) uncertainty in % cover predictions

LCTA Vegetation Data

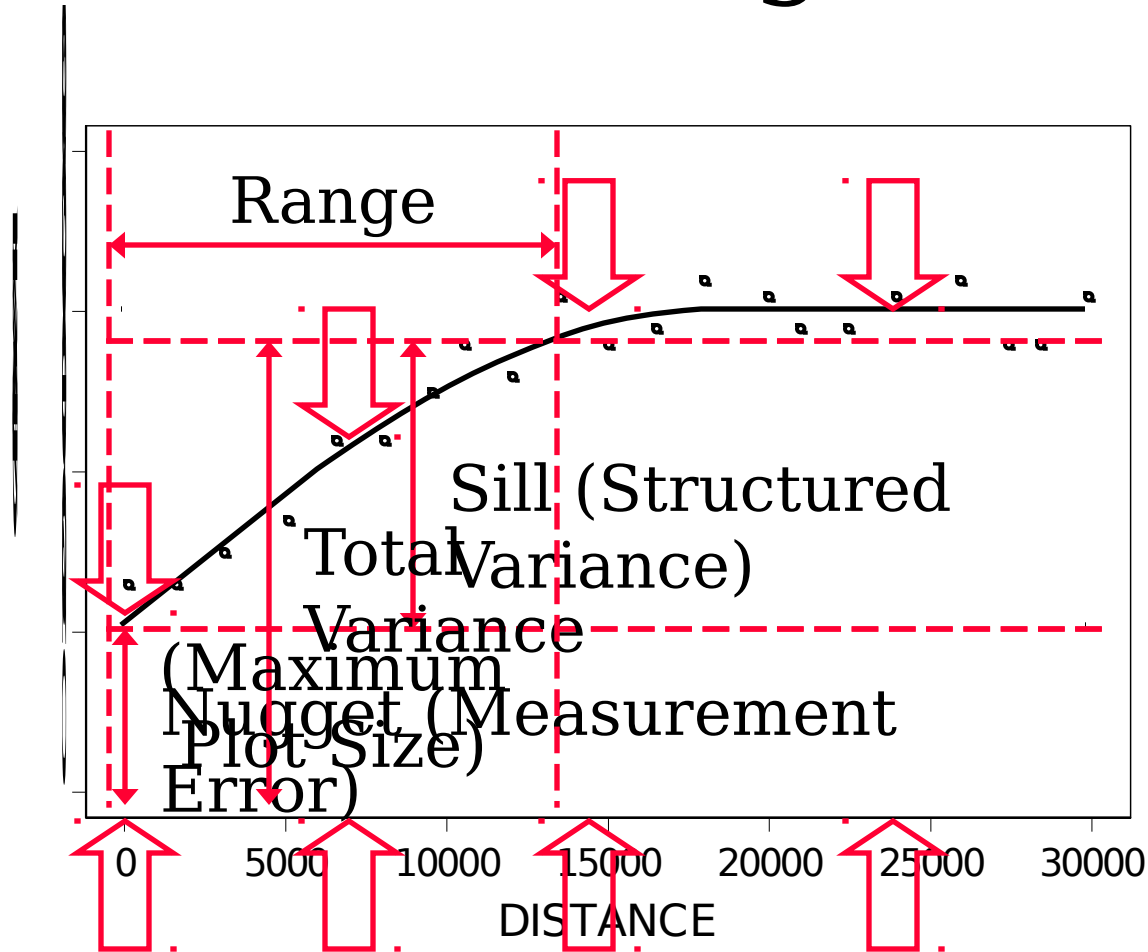
- 214 plots
- Stratified random plot distribution
- 100m transects
- Point-intercept method
- Data recorded by point



Research Questions

- What is the maximum appropriate plot size?
- What is the best method for estimating uncertainty (variance) in spatially correlated plot data?
- What is the optimal plot and sample size (sampling design) in terms of cost-efficiency and desired accuracy?

Semi-variogram



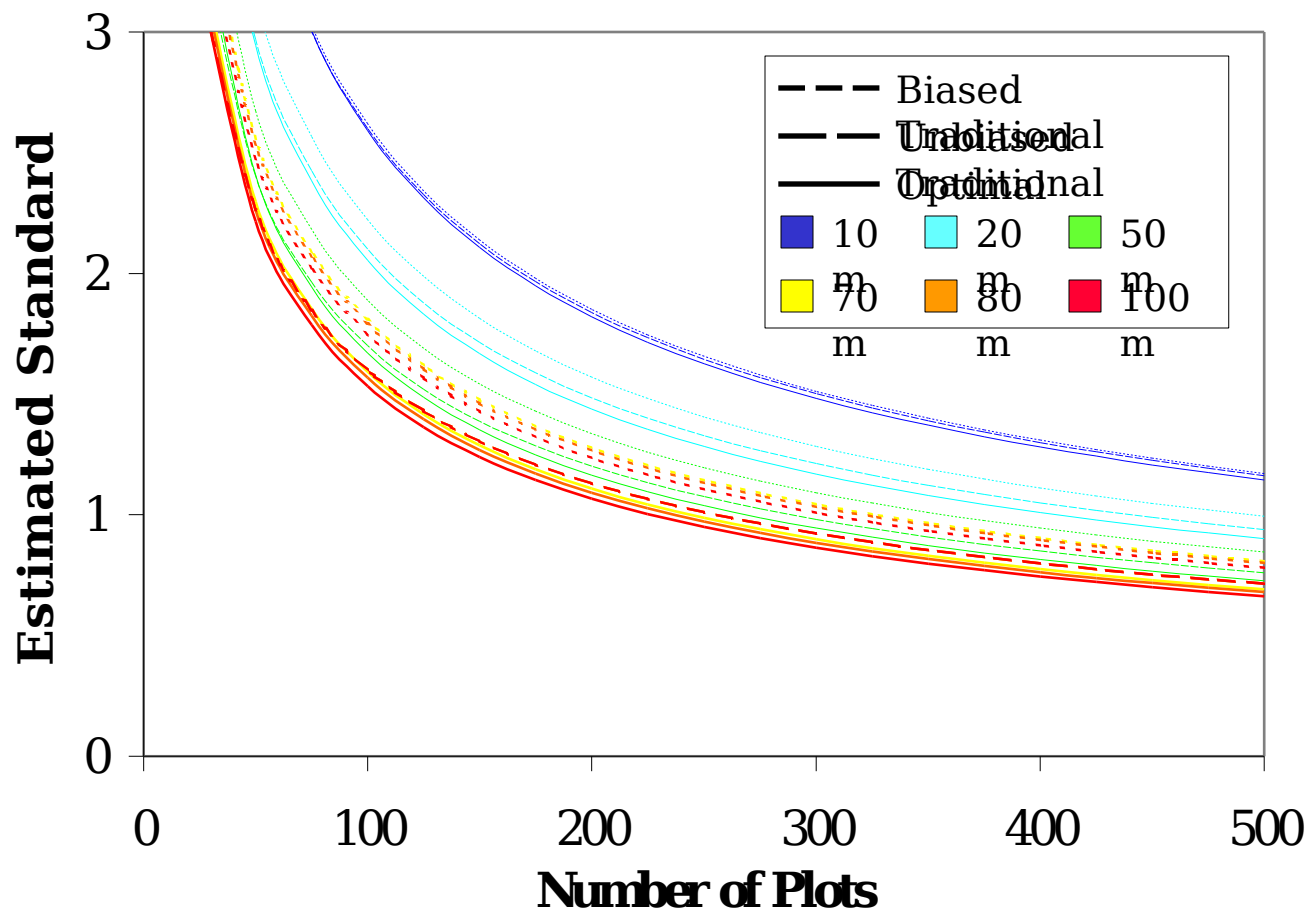
Maximum Appropriate Plot Size

- Based on within plot range parameter
- 6 cover types (grass, forb, shrub, half-shrub, tree and woody) at 37 plots
- Mean of range parameters – 32 to 52m
- Maximum appropriate plot size is <100m

Best Method for Estimating % Cover Uncertainty

- Traditional method – considers plots independently
- Kriging method – considers spatial variability within and between plots

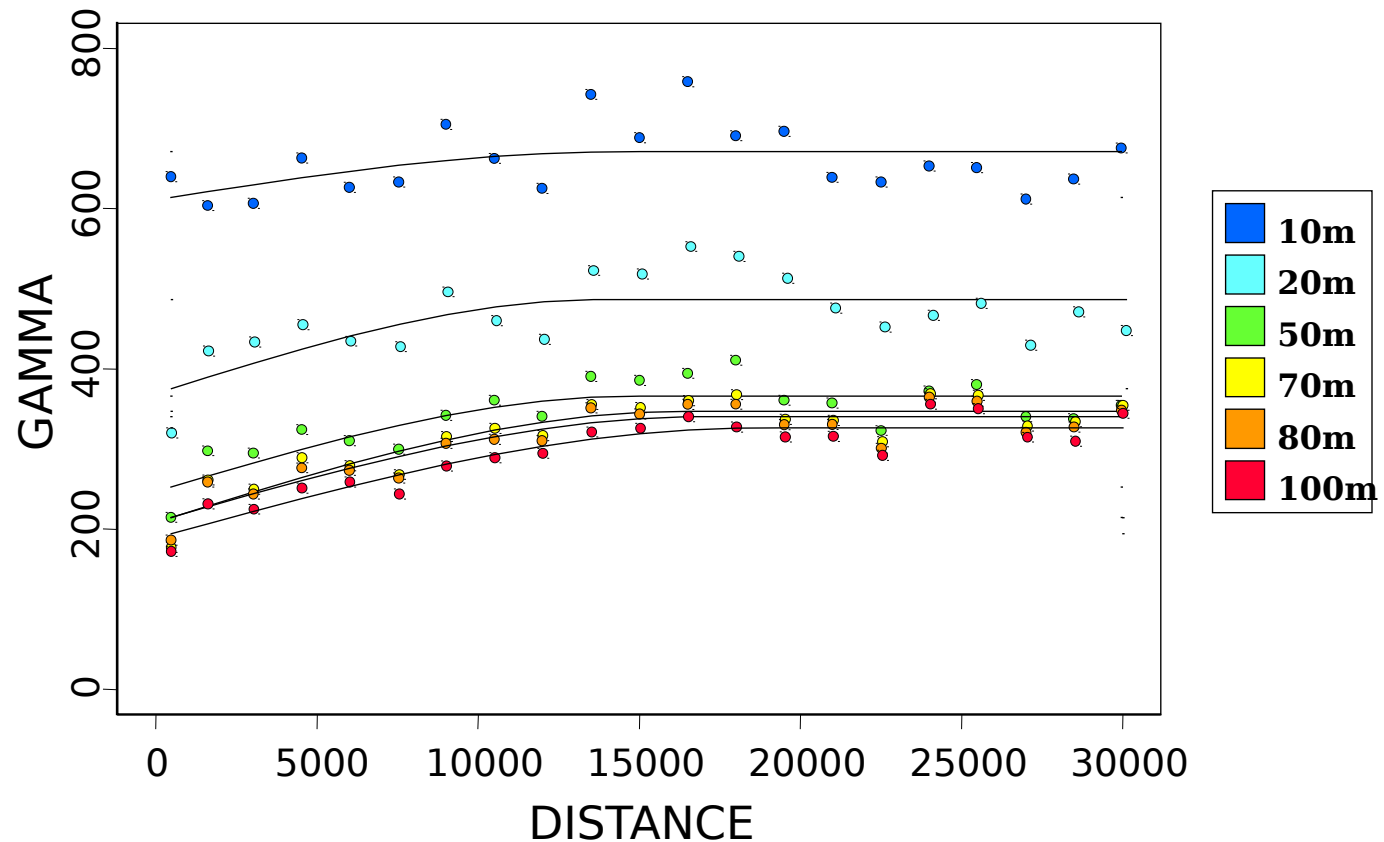
Variance Estimate Comparison



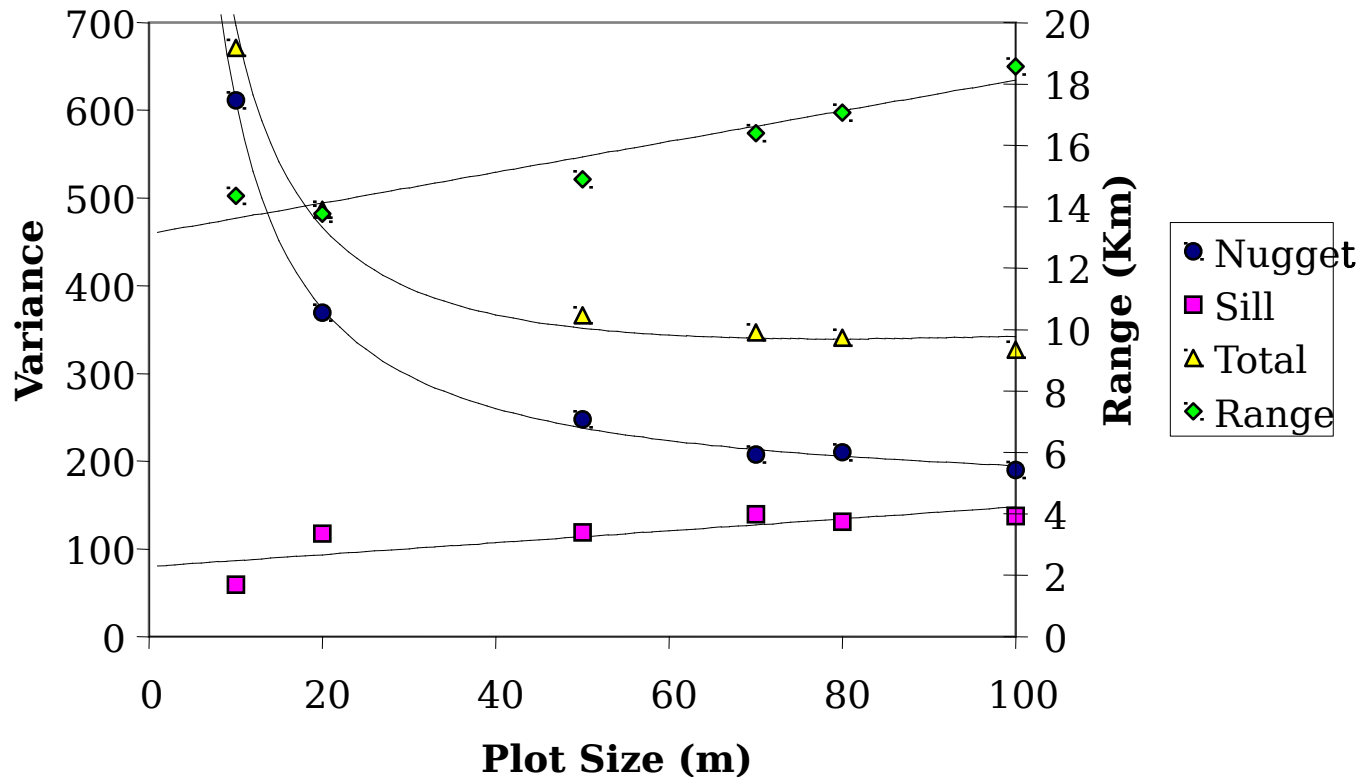
Optimal Sampling Design Method

- Measure prediction uncertainty for different combinations of plot and sample sizes accounting for spatial correlation within and between plots
- Model uncertainty as a function of cost
- Identify cost-efficient sample designs from uncertainty models

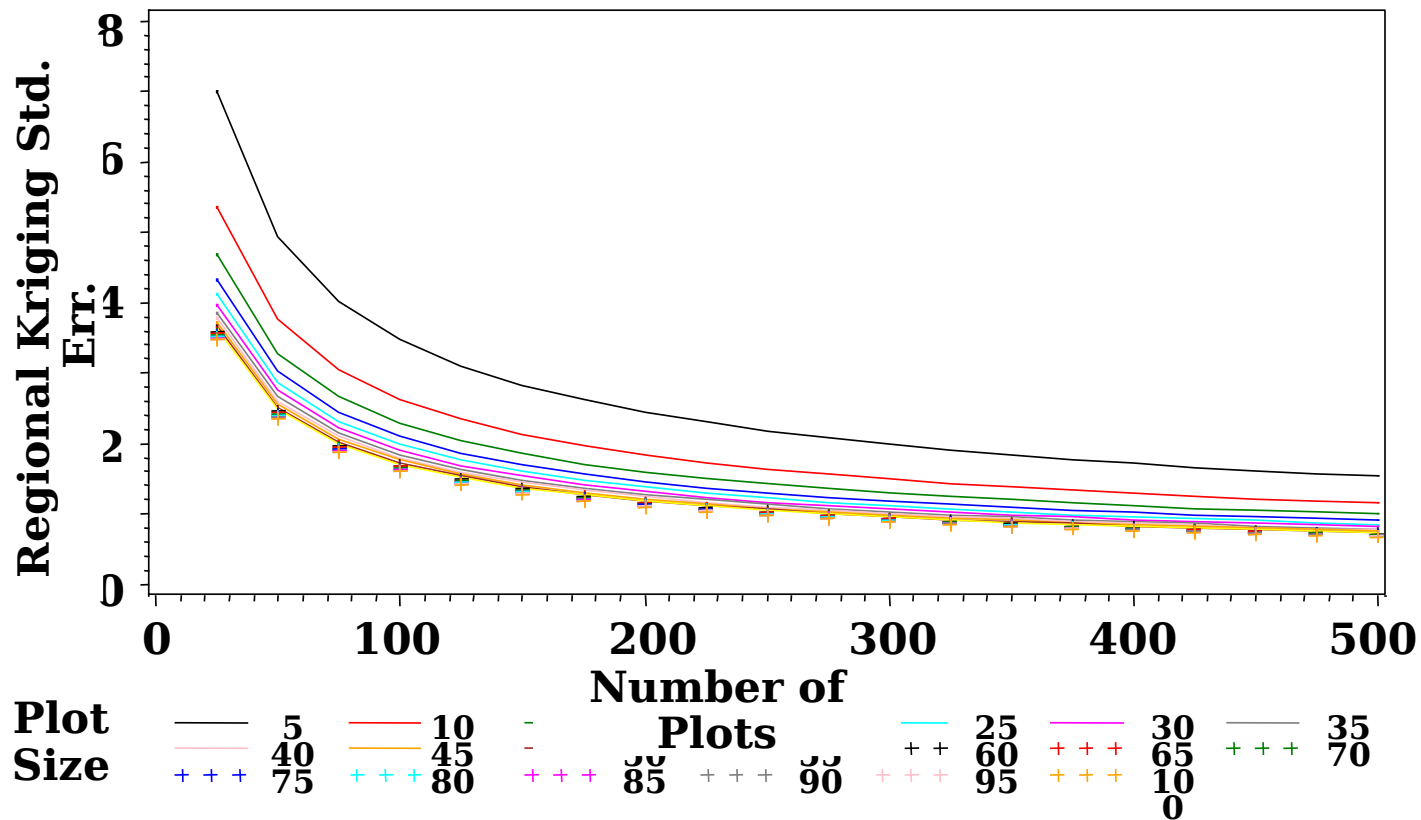
Plot Size Affects Uncertainty



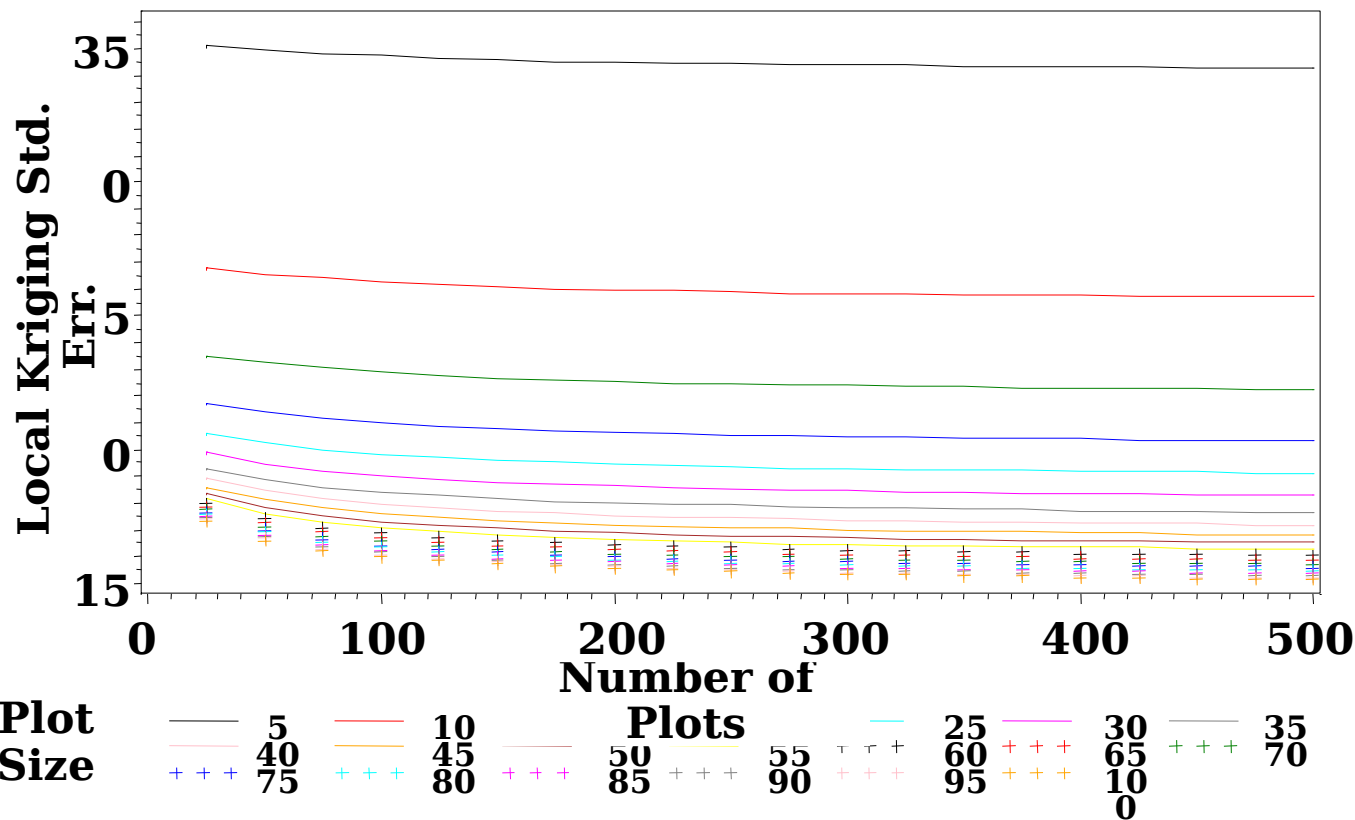
Model Semi-variogram Attributes



Regional Uncertainty by Plot & Sample Size



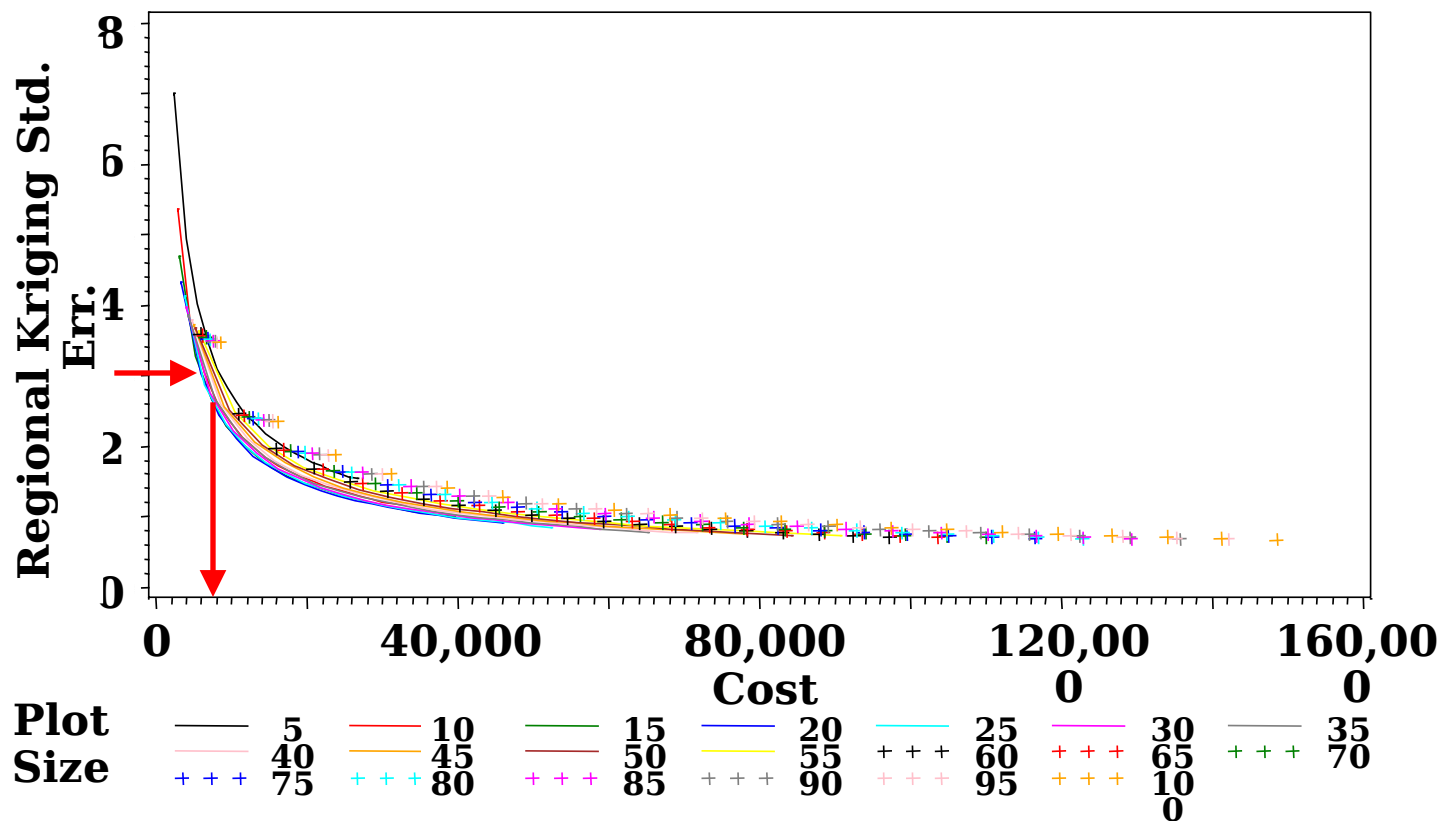
Local Uncertainty by Plot & Sample Size



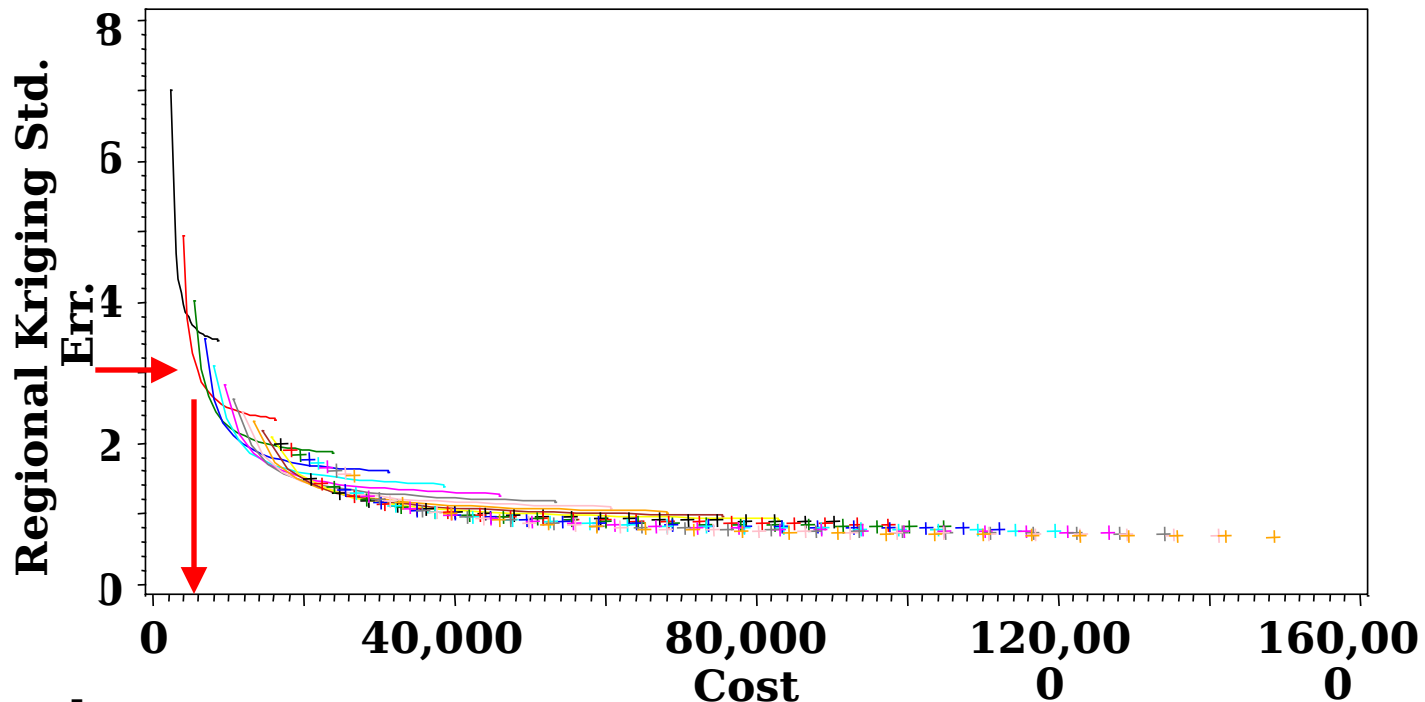
Cost in Person-minutes

- Setup time = 29 minutes/plot
- Travel time = 5.645 minutes/Km
- Measurement time = 2.57 minutes/m

Regional Uncertainty by Plot Size & Cost



Regional Uncertainty by Sample Size & Cost

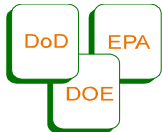


Number of
Plots

—	25	—	50	—	75	—	100	—	125	—	150	—	175
+++	20	+++	22	+++	25	+++	27	+++	30	+++	32	+++	35
	37		40		42		45		47		50		55

SERDP

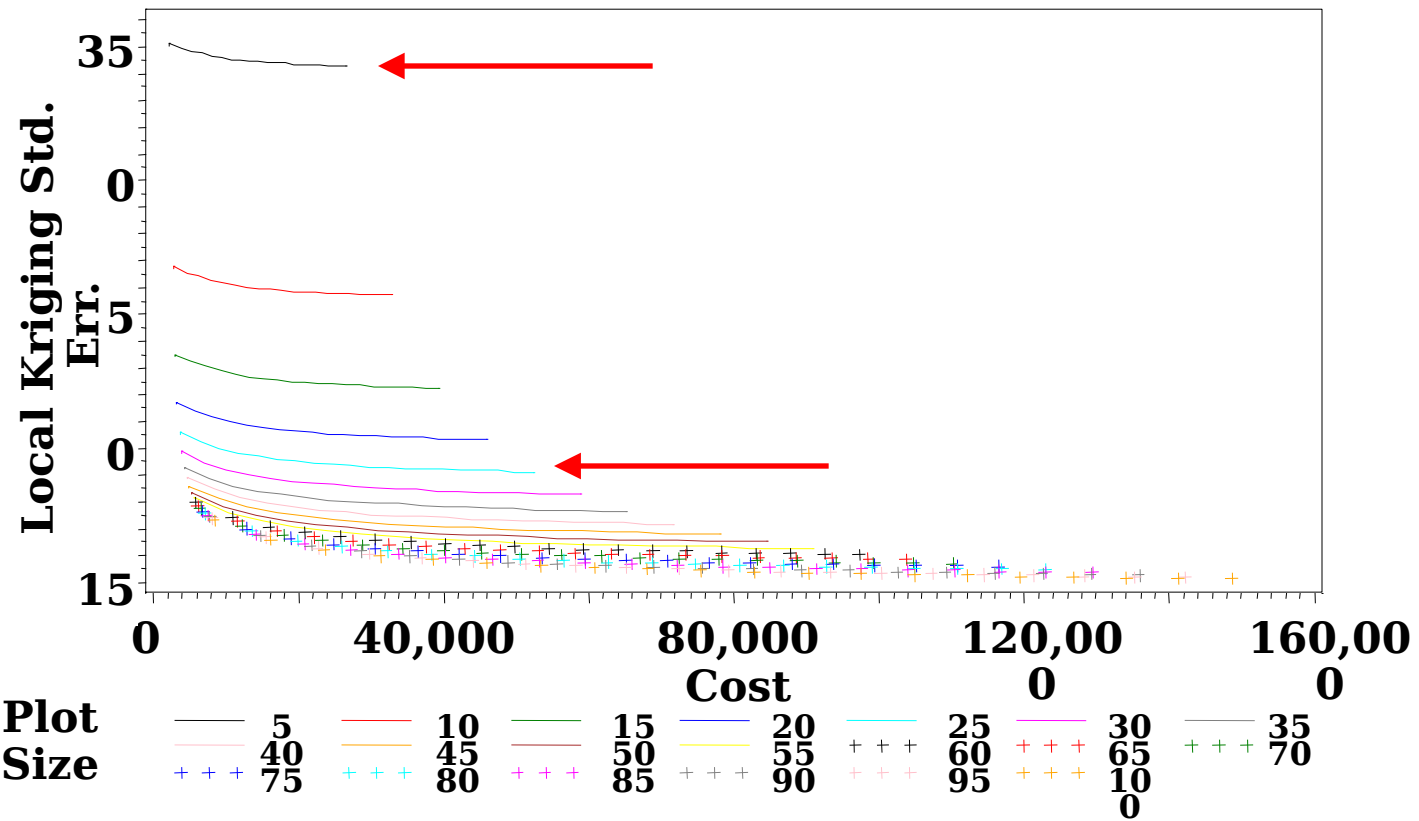
Strategic Environmental Research
and Development Program



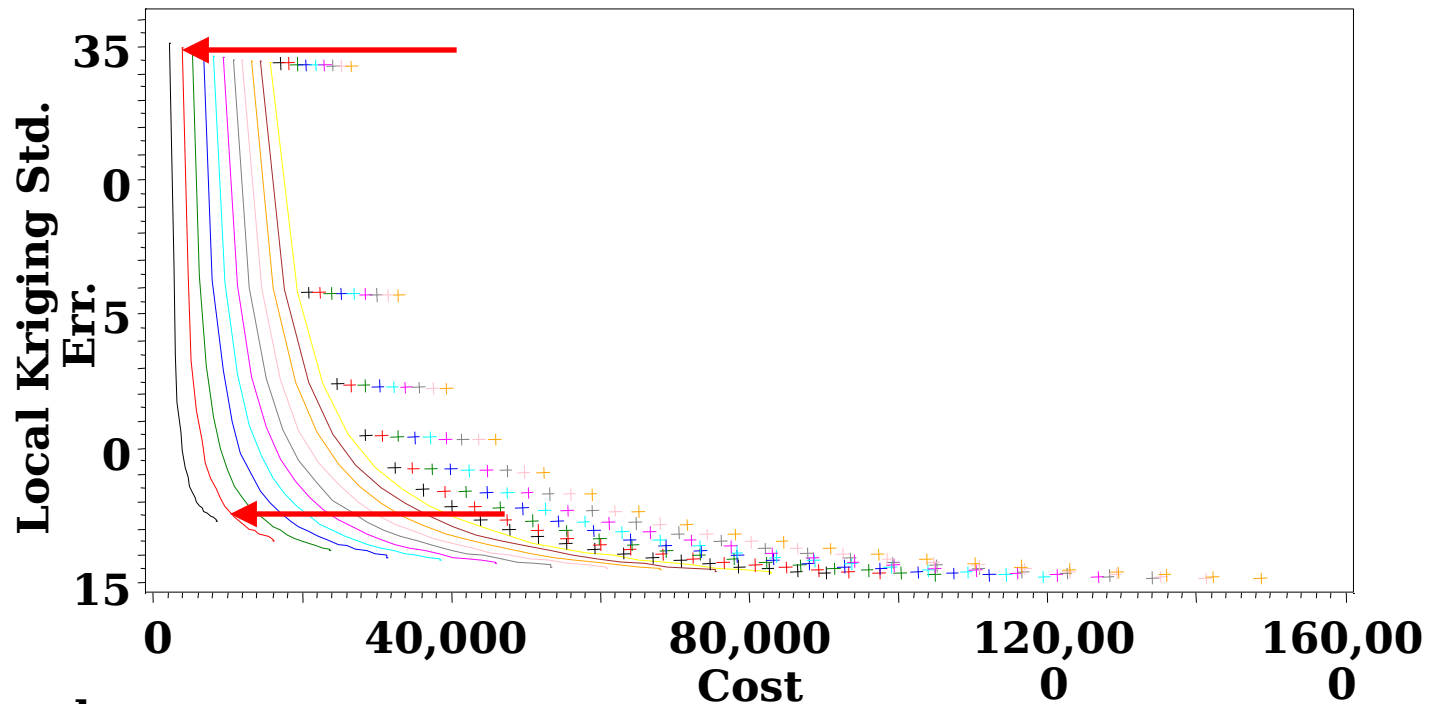
Improving Mission Readiness Through
Environmental Research



Local Uncertainty by Plot Size & Cost



Local Uncertainty by Sample Size & Cost

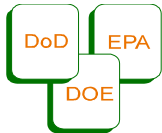


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SERDP

Strategic Environmental Research and Development Program



Improving Mission Readiness Through Environmental Research



Conclusions

- Kriging variance smaller than variance estimated by traditional method
- Sample size affects regional kriging standard error more than plot size
- Plot size affects local kriging standard error more than sample size

Recommendations for Ft. Hood

- 100m plot size is sufficient for local uncertainty estimates
- Number of plots depends on required precision for regional uncertainty estimates

Questions and/or Comments